18. (New) The method of claim 16, wherein the amount of coated conductive polymer ranges from 1 to 10 wt% based on the weight of the lithium metal oxide.

19. (New) The method of claim 16, wherein the lithium complex metal oxide is coated with the coating solution to form a coating layer having a thickness ranging from 0.1 to 1 μm .

20. (New) The method of claim 16, wherein the lithium complex metal oxide is coated generally evenly over the entire surface of the metal oxide.

REMARKS

Claims 1 to 20 are pending. Applicant has added new claims 13 to 20. The new claims find full support in the original specification and claims. In particular, new claims 13 and 20 find support in the specification at page 4, lines 27 to 30. No new matter is presented. In view of the above amendments and following remarks, Applicant respectfully requests favorable reconsideration and a timely indication of allowance.

The Examiner rejected claims 1, 3, 4 and 12 under 35 U.S.C. § 103(a) as allegedly obvious over Koksbang et al. (U.S. Patent No. 5,368,959) in view of Kinard et al. (U.S. Patent No. 5,888,582). Applicant respectfully traverses this rejection.

Claim 1 recites a method of preparing a positive active material for a lithium secondary battery comprising preparing a coating solution by dissolving a conductive polymer in a solvent; and coating lithium complex metal oxide with the coating solution. This method is neither taught nor suggested by the cited references.

Koksbang discloses a battery where the positive electrode side of the battery includes a current collector comprising a conductive polymer, such as polyphenylene, polyaniline, polypyrrole or polythiophene. Koksbang explains that his invention addresses the alleged problem of corrosion of the metal current collector on the cathode, which limits the useful life of the battery. (See column 3, lines 1 to 8.) The current collector is formed by coating a metal foil with a solution containing pyrrole or thiophene and a lithium salt. The conductive polymer sheet is then removed from the foil and laminated onto a component of the cell, e.g., the cathode, for assembly. (See column 4, lines 35 to 47.) Koksbang

provides no teaching or suggestion of coating a lithium complex metal oxide with a conductive polymer coating solution to form a positive active material, as presently claimed.

Kinard is generally directed to an acid-doped polyaniline-based polymer solution for coating articles, such as batteries. Kinard states that one coated article of particular interest is a capacitive element that uses an acid-doped polyaniline-based polymer as a solid electrolyte. The Examiner relies on Kinard to provide the motivation "to coat the cathode with polyaniline, taught by Koksbang et al., by dissolving the polyaniline into a solvent, coating the substrate, and then drying the coating to form a film." (Office action at 3.) Although Kinard generally teaches the concept of coating an article with a polymeric solution, Kinard provides no teaching or suggestion to coat a lithium complex metal oxide to form a positive active material, as claimed.

Accordingly, Koksbang and Kinard, even in combination, fail to provide motivation to coat a lithium complex metal oxide to form a positive active material. Therefore the combination of Koksbang and Kinard does not render obvious independent claim 1 or any of claims 2 to 12 depending therefrom, and Applicant respectfully requests that the rejection over Koksbang and Kinard be withdrawn.

The Examiner rejected claim 2 as allegedly obvious over Koksbang and Kinard and further in view of Thometzek et al. (U.S. Patent No. 5,589,222). Applicant respectfully traverses this rejection.

As set forth above, even the combination of Koksbang and Kinard does not render obvious claim 1, from which claim 2 depends. Thometzek does not make up for the deficiencies of Koksbang and Kinard.

Thometzek is directed to hydrophobic free-flowing pellets comprising inorganic powders, such as metal oxides, and hydrophobic polyorganosiloxanes. The Examiner relies on Thometzek to teach the step of spray-drying. However, Thomztzek provides no teaching or suggestion of coating lithium complex metal oxides, much less to form a positive active material. Accordingly, even the combination of Koksbang, Kinard and Thometzek does not render obvious the present claims, and Applicant requests that the rejection over these references be withdrawn.

The Examiner rejected claims 8 and 9 as allegedly obvious over Koksbang and Kinard in combination with Takashashi et al. (U.S. Patent No. 5,679,480). Applicant respectfully traverses this rejection.

Again, the combination of Koksbang and Kinard does not render obvious claim 1, from which claim 9 depends, and Takashashi does not make up for the deficiencies of Koksbang and Kinard. The Examiner relies on Takashashi only to disclose specifically claimed lithium complex metal oxides. However, Takashashi provides no teaching or suggestion to coat the lithium complex metal oxides, as claimed. Accordingly, even the combination of Koksbang, Kinard and Takashashi does not render obvious the present claims, and Applicant requests that the rejection over these references be withdrawn.

The Examiner rejected claim 5 as allegedly obvious over Koksbang and Kinard further in view of Tasaka et al. (U.S. Patent No. 6,280,854). Applicant respectfully traverses this rejection.

The combination of Koksbang and Kinard does not render obvious claim 1, from which claim 5 depends. Tasaka does not make up for the deficiencies of Koksbang and Kinard.

The Examiner relies on Tasaka to disclose the addition of a conductive agent in the coating solution. However, Tasaka is directed to a polymer electrode where the active material comprises polyaniline, polypyrrole and a quinone compound, as well as a binder and a conducting agent. In other words, Tasaka is using the polymeric material as the positive active material, as discussed in the Background section of the present invention. Tasaka does not teach or suggest forming the positive active material by coating a solution of polymeric material on a lithium complex metal oxide. Accordingly, even the combination of Koksbang, Kinard and Tasaka does not render obvious the present claims, and Applicant requests that the rejection over these references be withdrawn.

The Examiner rejected claims 6, 7, 10 and 11 as allegedly obvious over Koksbang, Kinard and Tasaka further in view of Takei et al. (U.S. Patent No. 6,337,155). Applicant respectfully traverses this rejection.

The Examiner relies on Takei to teach that polyethylene oxide can be included in the coating solution. Takei teaches a battery where the conductive material for the cathode is formed by polymerizing a monomer on the surface of metal oxide particles constituting the cathode. (See column 3, lines 63 to 66.) Takei describes the use of lithium metal oxides (see column 4, lines 13 to 15), as well as the use of polypyrrole, polyaniline, polythiophene and polyfuran as suitable conductive polymers (see column 4, lines 20 to 22). In accordance with the method of Takei, the metal oxide powder particles are added to a solution of monomer in a solvent, and then the monomer is polymerized to form the conductive polymer on the surface of the metal oxide. (Column 4, lines 27 to 34.) In contrast, the

present claims recite dissolving a conductive polymer in a solvent to prepare a coating solution, and then coating the metal oxide with the coating solution. As explained in the present specification at page 2, lines 1 to 9, the method of Takei is disadvantageous in that γ-MnO_2 formed from the modified complex metal oxide is oxidized during the polymerization, resulting in poor performance, including poor initial capacity and unstable cycle characteristics. Thus, Takei coats the metal oxide using a method different from that claimed, and does not teach or suggest the presently claimed method. Accordingly, even the combination of Koksbang, Kinard and Takei does not render obvious the present claims, and Applicant requests that the rejection over these references be withdrawn.

Additionally, Takei teaches that the layer of conductive polymer is formed in the form of a network or spots so that the film layer partially exposes the underlying metal oxide so as to ensure the contact of the metal oxide particle and the alkaline metal ion and not to prevent the cathodic reaction. (See column 4, lines 49 to 67.) The inventive method, in contrast, results in the entire surface of the metal oxide being coated. New dependent claim 13 recites the limitation that the lithium complex metal oxide is coated generally evenly over the entire surface of the metal oxide. Accordingly, this limitation is similarly neither taught nor suggested by Takei, alone or in combination with Koksbang and Kinard.

For all these reasons, pending claims 1 to 20 are in condition for allowance, and a timely indication of allowance is respectfully requested.

Respectfully submitted,

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